EE314 Digital Electronics Laboratory 2017-2018 Spring Term Project Proposal Report

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***Abstract*—The project**

***Index Terms*—The, laboratory , project**

I. Introduction

In this project, our aim is to design a oscilloscope.

II. Project

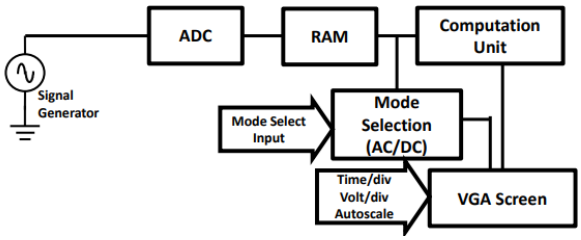

Figure 1: The Block Diagram of the project

Figure 1

A. ADC

B. RAM

C. Computation Unit

Computation unit is the unit responsible for all kinds of mathematical calculation of the project. This Unit can be considered as a brain of the project.

D. Mode Selection (AC/DC)

Two slide switches will be assigned to retrieve the desired mode information from the user. According to the information the screen will display according to the desired mode.

a) AC Mode

In AC Mode operation of the oscilloscope, the DC offset voltage is removed from the input voltage before it is reflected to the VGA monitor. For that Computation Unit will be used to extract offset information from stored data.

b) DC Mode

In DC Mode operation of the oscilloscope, the DC offset voltage is untouched from the stored data of the input voltage. The stored data is reflected directly to the VGA monitor.

E. VGA Screen

VGA is a widely used standard in video industry for the transmission of video signals from a computer or microprocessor into a monitor or TV. Each 640x480 image is called a 'frame' and each frame contains 480 lines which are made up of 640 pixels. We will use a standard LCD VGA Monitor as a display for our FPGA Oscilloscope. We will build a controller module for this part called VGA Controller.

VGA Controller

The VGA controller combines the data drom RAM and Computation Unit to create a signal that can be displayed on the VGA monitor. Each of the RAM Modules contains an image that is ready for display on the screen. However, the data must be positioned relative to each other and combined. Also this module performs once a second as desired in the project requirements. The VGA controller also gets data from different data inputs such as Time/div and Voltage/div in order to reflect the waveform as user requires.

Time/div Input

This module will supply an input data for the VGA controller for user preferences. Two push buttons will be assigned for the Time/div inputs that can be considered as Time+/div and Time-/div. As user pushes to Time+/div button, the time scale will be larger than the previous value. Similarly, as the user pushes to Time-/div button, the time scale will be smaller than the previous value. According to user preferences, this module allows user to see wider or narrower parts of input waveform.

Voltage/div Input

This module will supply an input data for the VGA controller for user preferences. Two push buttons will be assigned for the Voltage/div inputs that can be considered as Voltage+/div and Voltage-/div. As user pushes to Voltage+/div button, the voltage scale will be larger than the previous value.

Similarly, as the user pushes to Voltage-/div button, the voltage scale will be smaller than the previous value. According to user preferences, this module allows user to fit the voltage waveform to the screen.

Autoscale Input

This module will also supply an input data for the VGA controller for user preferences. Since we are planning to use all push buttons for other modules. One slide switch will be assigned to this module. As the user triggers the button, this module will scale the waveform for the display such that it fits the display best.

III. Conclusion

Conclusion

References

[1] J.-J. Lin, Y.-P. Li, W.-C. Hsu, and T.-S. Lee, "Design of an FMCW radar baseband signal processing system for automotive application," SpringerPlus, vol. 5, no. 1, 2016.